

**Notice of Allowability**

Application No.

09/939,327

Applicant(s)

ZHAO ET AL.

Examiner

Alan Diamond

Art Unit

1753

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the request for continued examination filed March 9, 2005.
2. ☒ The allowed claim(s) is/are 1-5,8-10,14-18,21,22 and 25-29.
3. ☒ The drawings filed on 17 December 2001 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All   b) ☐ Some\*   c) ☐ None   of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
  6. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
    - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
      - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
    - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |   |  |
|---|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)  | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)                                  |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date <u>04012005</u> . |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),<br>Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment  |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material          | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance                         |
|   | 9. <input type="checkbox"/> Other _____  |

### EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Stephen Macevich on March 31, 2005.

The application has been amended as follows:

#### In The Claims

In claim 1, at line 10, after "material" and before the period please insert --and such that fewer bubbles form in said channel and reservoir when establishing said field across a driving electrode of bare platinum--.

In claim 25, at line 9, please delete "reservoir" and insert in its place --reservoirs--.

2. The following is an examiner's statement of reasons for allowance: The microfluidic device of claim 1 requires a driving electrode used to apply a field of at least 400 V/cm comprised of an electrically conducting silver/silver chloride ink pattern on at least one of the substrate and cover such that when a material is present in the channel and reservoir said ink pattern makes electrical contact with the material and such that fewer bubbles form in said channel and reservoir when establishing said field across a driving electrode of bare platinum. The method in claim 25 is of reducing bubble formation during electrokinetic applications in a microfluidic device having

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interconnected channels and reservoirs and requires establishing a field of at least 400 V/cm across at least one driving electrode having a surface comprising silver and silver chloride and another driving electrode such that fewer bubbles form in said channels and reservoirs as are formed when establishing said field across driving electrodes of bare platinum.

None of the primary references relied upon by the Examiner, i.e., Bentsen et al (US 6,375,871), Bjornson et al (US 6,103,199), Hu et al (US 6,623,860), Bjornson et al (US 6,284,113), and Bjornson et al (US 2002/0092767), teaches the use of a silver/silver chloride driving electrode with its microfluidic device. The closest reference is Bentsen et al, which teaches "silver filled inks" (see col. 11, line 3), which still is not a teaching of silver/silver chloride. In order to bridge the gap of the silver/silver chloride driving electrode, the Examiner relied upon Guy et al (US 5,362,307) and Chan (US 5,565,143). However, both Guy et al (col. 6, lines 57-59; and col. 20, lines 16-38) and Chan (col. 1, lines 15 and 23; and col. 2, lines 35-37) are drawn to low voltage applications of the silver/silver chloride driving electrode. As noted above, instant claim 1 recites that the driving electrode is used to apply a field of at least 400 V/cm and that fewer bubbles form in said channel and reservoir when establishing said field across a driving electrode of bare platinum. As also noted above, instant claim 25 recites establishing a field of at least 400 V/cm across at least one driving electrode having a surface comprising silver and silver chloride and another driving electrode such that fewer bubbles form in said channels and reservoirs as are formed when establishing said field across driving electrodes of bare platinum.

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Bentsen et al and Hu et al are silent concerning V/cm field strength and bubble formation. Bjornson et al '199 (col. 22, lines 12-15), Bjornson et al '113 (col. 18, lines 64-65), and Bjornson et al '767 (paragraph 0051) teach a field of 10 to 1000 V/cm, with 200-600 V/cm being more typical. However, as noted above, the Bjornson et al references do not teach a silver/silver chloride driving electrode. All of said primary references are silent concerning bubble formation, i.e., the problem that the instant invention seeks to solve (see paragraphs 0010 and 0070 of the instant specification). Accordingly, it would not have been obvious to use a silver/silver chloride driving electrode to apply or establish a field of at least 400 V/cm such that fewer bubbles form in the channel and reservoir when establishing said field across a driving electrode(s) of bare platinum. As far as said primary references are concerned, it would not make a difference which one of their taught driving electrode materials is used. Furthermore, as noted above, the Guy et al and Chan references would, at best, lead a skilled artisan to a low field.

The instant field of at least 400 V/cm is supported by the specification at, for example, paragraph 0070 which teaches the application of higher voltages or electric fields in electrokinetic applications, and at paragraphs 00111, 00114, 00126, 00128, 00129, and 00133 which teach a field strength of 400 V/cm and increasing the field strength from the 400 V/cm. The instant limitation concerning bubble formation with respect to a bare platinum electrode is supported by paragraphs 00128 to 00133 of the instant specification.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is 571-272-1338. The examiner can normally be reached on Monday through Friday, 5:30 a.m. to 2:00 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alan Diamond  
April 1, 2005

Alan Diamond  
Primary Examiner  
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